

In the Claims

1 (currently amended). A method of identifying determining if active bioremediation pathways activity is occurring at a site comprising:

- a) contacting the microbial flora at the a microbial community at a subsurface site or down-well groundwater site with a sterile solid support loaded or coated with a substrate that comprises an isotope;
- b) incubating said solid support in said site for a period of time sufficient to establish a biofilm of microbes from said microbial community on said solid support;
- c) identifying biomarkers obtained from the microbes on said solid support into which isotopes have been incorporated components of said substrate have been incorporated; and
- d) correlating the biomarkers containing components of said substrate with particular microbes or subsets of microbial organisms or components of a bioremediation pathway known to cause bioremediation to determine if active bioremediation is occurring at said site.

2 (original). The method according to claim 1, wherein said biomarkers are selected from the group consisting of lipids, nucleic acids, proteins, and carbohydrates.

3 (currently amended). The method according to claim 1, wherein said biomarkers are respiratory quinones, diglycerides, sterols, intact phospholipids, poly beta-hydroxyalkonates, archaeol and caldarchaeols, ornithine lipids, sphingolipids, carotenoides, glycerides, glycolipids,

gangliosides, eicosanoids, hopanes, isoprenoids, terpenes, fatty acids, fatty alcohols, waxes, fatty aldehydes, proteolipids or lysolipids.

4 (currently amended). The method according to claim 2, wherein said biomarkers are characteristic of a subset or subset of microbial organisms.

5 (currently amended). The method according to claim 3, wherein said biomarkers are characteristic of a subset or subset of microbial organisms.

6 (currently amended). The method according to claim 1, wherein said isotope is component is: a) an isotope selected from ²H, ¹³C, ¹⁵N, an isotope as set forth in Table 1 or a naturally occurring isotope; or b) a nutrient that is incorporated into a biomarker.

7 (canceled).

8 (currently amended). The method according to claim 1, wherein the biomarkers are identified by one or more of the following methods: pyrolysis, optionally with *in situ* derivatization and isotope ratio mass spectrometry[[.]], phospholipids fatty acid (PFLA) analysis, polymerase chain reaction denaturing gradient gel electrophoresis (PCR-DGGE)[[.]], expanded signature lipid biomarker analysis (SLB), terminal restriction fragment length polymorphism (T-RFLP) analysis of 16S rDNA or specific genes, high performance/atmospheric pressure chemical ionization/tandem mass spectrometry (HPLC/APCI/MS/MS) or liquid chromatography/tandem mass spectrometry (LC/MS/MS).

9 (currently amended). A method of identifying the microbial flora-community at a site comprising:

- a) contacting the microbial flora at the a microbial community at a subsurface site or down-well groundwater site with a sterile solid support loaded or coated with a substrate that comprises an isotope;

- b) incubating said solid support in said site for a period of time sufficient to establish a biofilm of microbes from said microbial community on said solid support;
- c) identifying biomarkers obtained from the microbes on said solid support into which isotopes have been incorporated components of said substrate have been incorporated; and
- d) correlating the biomarkers with particular microbes identifying the microbes present at said site by analyzing the biomarkers and associating component containing biomarkers with particular microbes or subsets of microbial organisms or components of a bioremediation pathway.

10 (original). The method according to claim 9, wherein said biomarkers are selected from the group consisting of lipids, nucleic acids, proteins, and carbohydrates.

11 (currently amended). The method according to claim 9, wherein said biomarkers are respiratory quinones, diglycerides, sterols, intact phospholipids, poly beta-hydroxyalkonates, archaeol and caldarchaeols, ornithine lipids, sphingolipids, carotenoides, glycerides, glycolipids, gangliosides, eicosanoids, hopanes, isoprenoids, terpenes, fatty acids, fatty alcohols, waxes, fatty aldehydes, proteolipids or lysolipids.

12 (currently amended). The method according to claim 10, wherein said biomarkers are characteristic of a subset or subset of microbial organisms.

13 (currently amended). The method according to claim 11, wherein said biomarkers are characteristic of a subset or subset of microbial organisms.

14 (currently amended). The method according to claim 9, wherein said component is:
a) an isotope selected from isotope is ^2H , ^{13}C , ^{15}N , an isotope as set forth in Table 1 or a naturally occurring isotope; or b) a nutrient that is incorporated into a biomarker.

15 (canceled).

16 (currently amended). The method according to claim 9 wherein the biomarkers are identified by one or more of the following methods: pyrolysis, optionally with *in situ* derivatization and isotope ratio mass spectrometry[[]], phospholipids fatty acid (PFLA) analysis, polymerase chain reaction denaturing gradient gel electrophoresis (PCR-DGGE)[.], expanded signature lipid biomarker analysis (SLB), terminal restriction fragment length polymorphism (T-RFLP) analysis of 16S rDNA or specific genes, high performance/atmospheric pressure chemical ionization/tandem mass spectrometry (HPLC/APCI/MS/MS) or liquid chromatography/tandem mass spectrometry (LC/MS/MS).

17 (new). The method according to claim 1, wherein said site is a down-well groundwater site.

18 (new). The method according to claim 1, wherein said site is a subsurface site.

19 (new). The method according to claim 6, wherein said component is an isotope.

20 (new). The method according to claim 6, wherein said component is a nutrient.

21 (new). The method according to claim 9, wherein said site is a down-well groundwater site.

22 (new). The method according to claim 9, wherein said site is a subsurface site.

23 (new). The method according to claim 14, wherein said component is an isotope.

24 (new). The method according to claim 14, wherein said component is a nutrient.